

Biobank and Pathology Facility: A Successful Combination

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ABSTRACT

Financial sustainability in biobanks has recently become a key issue globally, as biorepositories struggle to balance limited external funding and high operating costs. To maximize governance and operational efficiency, the Pathology Facility and the University College London (UCL)/UCL Hospitals Biobank for Studying Health and Disease (“the Biobank”) have been grouped together under the same management at the UCL Cancer Institute. This paper explores the operational and financial interaction between the Pathology Facility and the Biobank over a period of 3 years (2017–2019). Since 2017, only a minority of the requests included collection of samples from the archive or molecular biology services, and most of the requests included histology services. Our data confirmed the difficulty for a biobank to achieve financial sustainability. The integration of the Pathology Facility with the Biobank within a single laboratory management and delivery infrastructure was shown to be an effective management option and presented a unique opportunity to overcome financial and operational challenges, thus improving efficiency and lowering costs for both parties.

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INTRODUCTION

Major breakthroughs in the life sciences, such as the deciphering of whole genomes or precision medicine, are the result of both new technologies and joint efforts of biologists, physicists, mathematicians, and computer scientists.^[1] The acceleration of technological innovations means that individual researchers can neither afford nor are able to master all state-of-the-art techniques. Research breakthroughs are not possible without support infrastructures to provide specific technologies and expertise.

Core facilities are specialized laboratories that offer training, the use of instruments, consulting, and specialized services; they serve institutional researchers working in individual laboratories and provide services to external customers. The technical

advice provided by core facilities is critical for biomedical researchers who are not trained in a specific technique or field or who can find it difficult to interpret specialized data.[\[2\]](#) In translational research, the histology laboratory is a key asset for the delivery of experiments, technical support, and consultation to research investigators. From routine processing of tissues to immunohistochemistry problem solving, histology is central to biological and medical science, as it stands at the crossroads between biochemistry, molecular biology, and physiology on the one side and disease processes and their effects on the other. Knowledge of normal histological appearances is essential to recognize abnormal diseased structures and to comprehend how abnormal biochemical and physiological processes result in disease.[\[3\]](#)

Over the past 20 years, biobanks have been recognized as a key infrastructure for biomedical research by the scientific community around the world. A biobank is defined as “a facility for the collection, preservation, storage and supply of biological biospecimens and associated data, which follows standardized operating procedures and provides material for scientific and clinical use.”[\[4\]](#) Research-focused biobanks comprise biospecimens often obtained from surgery and autopsies that are linked to genetic, genealogical, health, and other personal information and can be used for multiple research purposes. They accelerate research efforts because researchers do not have to expend valuable time and funds on the collection, storage, and curation of human tissue samples and data.[\[5\]](#)

A research biobank is a long-term investment that requires a sound business plan with financial sustainability as a priority.[\[6\]](#) Traditionally, many biobanks were established with funds from a public or private grant from research funding agencies, institutions, or private and philanthropic organizations. The initial funds provided the biobank infrastructure, equipment, and possibly support staffing costs in the early years.[\[6\]](#) The major focus of a newly established biobank is to meet the initial collection goals, ie, numbers of biospecimens and data of acceptable quality to ensure the biobank’s value and utility in scientific research.

However, sustaining and maintaining a resource is expensive, and unfortunately, few biobanks have a robust plan to support their costs once the initial funding has been exhausted.[\[6\]](#) Many biobanks rely on new support grants, internal institutional funds, or cost recovery activities with academic or industry partners for materials and services. Without careful planning, none of these methods will provide long-term financial sustainability.[\[7\]](#) Although investigators have the required knowledge to

manage a biobank, they often lack the financial expertise to guarantee its long-term viability.[\[8\]](#)

This paper explores the operational and financial interaction between the Pathology Facility laboratory and the Biobank at the University College London (UCL) Cancer Institute. This analysis demonstrates how combining the Biobank and the Pathology Facility under single management has yielded operational and financial benefits.

MATERIALS AND METHODS

Biobank

The UCL/UCL Hospitals (UCLH) Biobank for Studying Health and Disease (“the Biobank”) was originally established to support the research program and scientific needs of the UCLH Pathology Department and the UCL Cancer Institute. It incorporates satellite locations at the Translational Medicine Research Tissue Centre in UCL’s Charles Bell House and the Royal National Orthopaedic Hospital Musculoskeletal Biobank. The Biobank meets all current legal and ethical requirements associated with tissue collection, storage of samples, and use for research. This includes having a Human Tissue Authority (HTA) Licence for the scheduled purpose of research (HTA Licence number 12055) and approval from the Health Research Authority National Research Ethics Service to collect, store, and issue biological samples and associated clinical information (Research Ethics Committee Reference 20/YH/0088). The Biobank consists of samples stored in the UCLH pathology archive and those collected prospectively by individual projects.

Pathology Facility

The Pathology Facility provides a wide range of tissue-based and molecular services to research scientists within the UCL Cancer Institute and throughout UCL ([Supplementary Tables 1 and 2](#)). Histology services include tissue processing and embedding, sectioning of both formalin-fixed paraffin-embedded and frozen samples, and hematoxylin and eosin (H&E) and immunohistochemistry tissue sections staining. The molecular biology services comprise DNA and RNA extraction, nucleic acid quality controls, and PCR. The Biobank services include collection and return of samples from the diagnostic archive.

RESULTS

For the period of this study (2017–2019), a total of 543 work requests were received. The work requested included sample collection from the archive, histology, and

molecular biology services.

Because the facility was originally established to support the research program and scientific needs of the Cancer Institute, it is unsurprising that most requests between 2017 and 2019 came from internal users (79.4%). Customers also came from UCL departments beyond the Cancer Institute and from external institutions, both public and private sector (20.6%).

A single work request may contain up to 4 different services. Table 1 shows a total of 978 different services were requested between 2017 and 2019 in the 543 work requests. In the facility, 89.5% of the work requests included histology services, 9.6% included collection of samples from the archive, and only 0.9% of the work requests involved molecular biology services. The most-requested histology services were processing and embedding (31.2%) and formalin-fixed paraffin-embedded blocks sectioning (31.5%), which were followed by H&E staining (23.4%).

Table 1		
<i>Distribution of the different services in each work request</i>		
		<i>n (%)</i>
Services requested		978
Histology	Processing and embedding	305 (31.2)
	Frozen section	27 (2.8)
	FFPE section	308 (31.5)
	H&E staining	229 (23.4)
	IHC staining	6 (0.6)
Molecular biology	Molecular experiments	9 (0.9)
Biobank	Blocks collection	94 (9.6)
<i>FFPE, formalin-fixed paraffin-embedded; IHC, immunohistochemistry.</i>		

DISCUSSION

Institutions are challenged to find the most efficient way to manage their centralized resources.^[2] It is common within research universities to share research equipment, facilities, and personnel across multiple investigators and laboratories. Over the last 2 decades, several leading institutes established fully fledged core facilities programs to provide a centralized research infrastructure. At the same time, translational research and personalized medicines saw explosive growth, fueling the need for a sustainable supply of well-documented and high-quality human tissue samples.

Both the Pathology Facility and the Biobank were originally established to support the research program and scientific needs of the UCL Cancer Institute. It is therefore unsurprising that most of the work done between 2017 and 2019 was requested by internal users. As discussed in the paper by Hockberger et al,^[9] core laboratories should carefully balance the risk of creating distrust by making their services available to external and commercial companies against the wish to achieve long-term financial sustainability. Because pathology facilities are funded by internal grants, it is assumed they will mainly serve the needs of internal scientists and then become financially self-sustaining once the grant funding is used up. In reality, a recent survey of biomedical core facilities indicated that organizations subsidize, on average, 33% of the direct costs to operate core facilities, with another 19% coming from core grants and private funds.^[10] Additionally, most core facilities operate on a direct-cost recovery model and therefore may rely more or less heavily on institutional support for indirect costs related to infrastructure, such as space, utilities, and maintenance. This model is unlikely to be sustainable in the current economic climate for all but the most heavily endowed organizations.

In our facility, most of the work requests between 2017 and 2019 included one or more histology services. The most-requested services were processing, embedding, sectioning, and H&E staining—all of which reflect the nature of the research in our institute. The facility is often involved in initial studies on animal models, for which sample preparation is key. It is difficult to draw substantive conclusions about the molecular biology services for which numbers were low. Nevertheless, the number of users for the molecular biology laboratory was similar to those in the histology laboratory. A possible explanation is that scientists request technical support for sectioning or histology-related experiments but prefer to perform molecular biology experiments themselves.

It has recently been reported that achieving financial sustainability for a biobank is difficult,[\[11\]](#) and our data confirms this view. In our institution, only 10% of the work requested over the 3 years was associated with the Biobank. The number of blocks per request was examined, and there was little difference between 2017, 2018, and 2019. The income generated from biobank requests was insufficient to cover the costs of maintaining the Biobank (HTA licence fees, software fees, etc; data not shown). Different strategies were explored to increase the number of Biobank users, including advertising and partnership with commercial companies, but our projects remained mostly internal and limited to the prospective collection of samples by individual groups.

In light of our results, the combination of the Pathology Facility with the Biobank is shown to be an effective management option. Institutional support is unlikely to be sufficient to cover operational costs without appropriate economic planning. The excellent relationship between customers and laboratory staff is built on trust, reasonable prices, and the high quality of the service provided.

The close interconnection between the Biobank and the Pathology Facility offered more than financial benefits. In fact, the Biobank governance of human samples was extended to the Facility: checks on the ethical approval were introduced in the work request, and training became more extensive for users using human samples. By reducing the number of personnel and steps involved, the sources of error were reduced as well. In fact, samples are collected, registered in the database, sectioned, and returned to the archive by the same member of staff. Additionally, one single database helped with the traceability of samples and elaboration of the strategy for future prospective collections of samples.

In conclusion, the integration of a traditional pathology laboratory and a biobank within a single laboratory management and delivery infrastructure presents a unique opportunity to overcome financial and operational challenges, thus improving efficiency and lowering costs within both organizations.

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Supplementary Material



[Supplementary Table 1.docx](#)

25 KB



[Supplementary Table 2.docx](#)

24 KB

Citations

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